

# An Advanced Micromachined Package for the Quartz Disk Resonant Gyroscope, Phase I

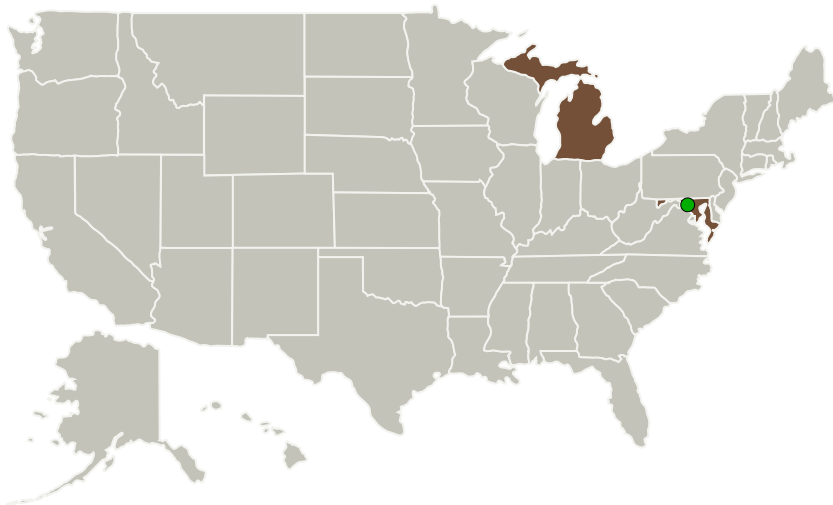
Completed Technology Project (2011 - 2011)



## Project Introduction

The objective of this proposal is to demonstrate the feasibility of a fully packaged microelectromechanical (MEMS) gyroscope with a 7 milliarcsecond pointing accuracy sufficient for space and terrestrial telescope pointing applications. This new environmental resistant packaged (ERP) resonant gyroscope will have a small size, weight and power (SWAP) with a mass of around 6 grams and a volume of 3.1 cm<sup>3</sup> (fully packaged and with drive electronics) at a cost of ~\$500 per axis in volume production. This would be 1/200th of the size and 1/40th of the price of the current state of the art. In phase I, the feasibility of achieving a 0.001 degree Celsius temperature stability will be investigated using the oven control feature of the ERP. This level of temperature control will mitigate the sensor's long term drift (bias drift). In Phase II through some small changes in the gyroscope layout and optimizations in the control electronics, a gyroscope system will be fabricated which is optimized for pointing applications. These optimized resonant gyroscopes will be integrated into the ERP package with its improved oven control capability. The goal will be to transition into preproduction runs after Phase II.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
ePack, Inc.	Lead Organization	Industry	Ann Arbor, Michigan
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Michigan

## Project Transitions

**February 2011:** Project Start

**September 2011:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137997>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

ePack, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

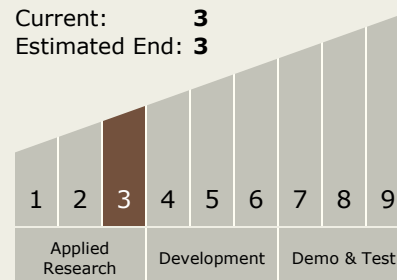
Carlos Torrez

### Principal Investigator:

Jay Mitchell

## Technology Maturity (TRL)

Start: **3**  
Current: **3**  
Estimated End: **3**



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## Technology Areas

### Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - └ TX17.2 Navigation Technologies
    - └ TX17.2.3 Navigation Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System